"EFFECTIVENESS OF DUAL TASK TRAINING VERSUS CONVENTIONAL THERAPY ON IMPROVING BALANCE AND EXECUTIVE FUNCTIONS IN PARKINSON'S PATIENTS"

A Dissertation Submitted To

THE TAMILNADU Dr.M.G.R. MEDICAL UNIVERSITY

CHENNAI

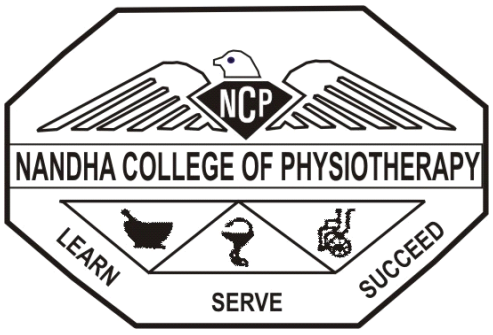
In partial fulfillment of the requirements for the awards of the

MASTER OF THE PHYSIOTHERAPY DEGREE

(PHYSIOTHERAPY IN NEUROLOGY)

Submitted by

Reg. No. 271720062



NANDHA COLLEGE OF PHYSIOTHERAPY

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MAY- 2019

THE TAMILNADU DR. M.G.R. MEDICAL UNIVERSITY

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The dissertation entitled

"Effectiveness of dual task training versus conventional therapy on improving balance and executive functions in parkinson's patients"

Submitted by

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Under the guidance of

Prof.V.VIJAYARAJ M.P.T(Neuro).,M(Acu).,DVMS., MIAP.,

The Dissertation Submitted To

THE TAMILNADU Dr.M.G.R MEDICAL UNIVERSITY,

CHENNAI

Dissertation evaluated on …….

INTERNAL EXAMINER **EXTERNAL EXAMINER**

CERTIFICATE BY THE HEAD OF THE INSTITUTION

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I wish him a great success in his dissertation work.

Place : Erode **Principal Signature**

Date :

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This is to certify that the dissertation entitled **"Effectiveness of dual task training versus conventional therapy on improving balance and executive functions in parkinson's patients"** is a bonafide compiled work carried out by Reg.No. 271720062, **Nandha College of Physiotherapy,Erode-638 052** in partial ful filment for the award of graduate degree in Master of Physiotherapy as per the doctrines of requirements for the degree from **THE TAMILNADU Dr.M.G.R.MEDICAL UNIVERSITY, Chennai.** The dissertation represents entirely an independent work on the part of the candidate but for the general guidance by me.

Place : Erode **Guide Signature**

Date :

DECLARATION

I hereby and present my project work entitled **"Effectiveness of dual task training versus conventional therapy on improving balance and executive functions in parkinson's disease"** is outcome of original research work was undertaken and carried out by me under the guidance of **Prof.V.VIJAYARAJ M.P.T(Neuro).,M(Acu).,DVMS., MIAP.,**

To the best of my knowledge this dissertation has not been formed in any other basic for the award of any other degree, diploma, associateship, fellowship, preciously from any other medical university.

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ACKNOWLEDGEMENT

I am very happy to express my heartfelt thanks to the **GOD** almighty giving me strength and wisdom in successfully completing this project work in an efficient manner.

I express my sincere Gratitude to our **Principal Prof. V.MANIVANNAN, M.P.T., (Ortho)., Nandha college of Physiotherapy, Erode** for leading me this success.

I deeply express my indebted thanks to my project guide **Prof.V.VIJAYARAJ M.P.T(Neuro).,M(Acu).,DVMS.,MIAP., Nandha college of Physiotherapy** for his valuable guidance encouragement and useful comments offered at every stage of work ardently towards the successful completion of the project work.

I also express my gratitude to our staff **Asst.Prof.M.JANANI M.P.T(Neuro).,MIAP.** And the all my beloved **Staffs of Nandha College of Physiotherapy** for leading me to this success.

I also have much gratitude to **MY FRIENDS** for their known interest and in my academic excellence.

Last but not the least, I would like to pay my gratitude to **My Parents & Sister** who always had so much confidence in me and always provided me with a constant silent support, encouragement and inspiration.

PREFACE

It was immense pleasure for me to present this project work on **"Effectiveness of dual task training versus conventional therapy on improving balance and executive functions in parkinson's patients"** because this opportunity made me learn a lot about this condition.

I have done this work with my best level by referring many Neurological books, journals and websites. I have assessed and given treatment to patient to improve their condition. I believe this project work will prove to be very useful for the physiotherapists to give a better knowledge while assessing and treating parkinson's patients.

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CHAPTER 1

INTRODUCTION

CHAPTER - 1

1.1) INTRODUCTION:

Parkinson's disease is a progressive disorder that is caused by degeneration of nerve cells in the part of the brain called the substantia nigra, which controls movement. These nerve cells die or become impaired, losing the ability to produce an important chemical called dopamine. Studies have shown that symptoms of Parkinson's develop in patients with an 80 percent or greater loss of dopamine-producing cells in the substantia nigra.

Normally, dopamine operates in a delicate balance with other neurotransmitters to help coordinate the millions of nerve and muscle cells involved in movement. Without enough dopamine, this balance is disrupted, resulting in tremor (trembling in the hands, arms, legs and jaw); rigidity (stiffness of the limbs); slowness of movement; and impaired balance and coordination – the hallmark symptoms of Parkinson's.

The cause of Parkinson's essentially remains unknown. However, theories involving oxidative damage, environmental toxins, genetic factors and accelerated aging have been discussed as potential causes for the disease. In 2005, researchers discovered a single mutation in a Parkinson's disease gene cases.

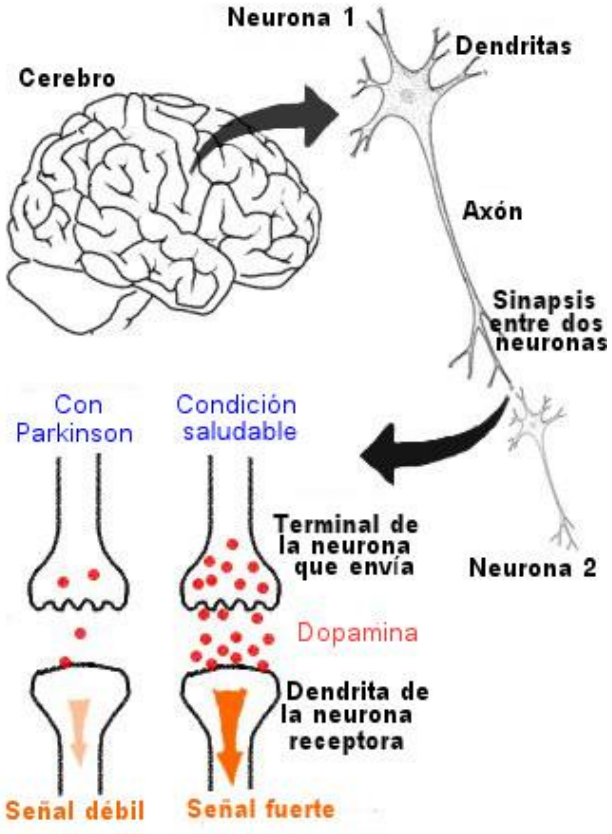


Fig:1.1.Parkinson's disease

Tremor in one hand is a early sign of Parkinson's disease

The symptoms of PD develop gradually. They often start with a slight tremor in one hand and a feeling of stiffness in the body.

Over time, other symptoms develop, and some people will have dementia.

Most of the symptoms result from a fall in dopamine levels in the brain.

One study, based in France, found in 2015 that men are 50 percent more likely to develop PD than women overall, but the risk for women appears to increase with age.

In most people, symptoms appear at the age of 60 years or over. However in 5–10 percent of cases they appear earlier. When PD develops before the age of 50 years, this is called "early onset" PD.

1.2. AIM OF THE STUDY

The aim of the to compare "Effectiveness of dual task training versus conventional therapy on improving balance and executive functions in parkinson's patients".

1.3. NEED FOR THE STUDY:

Parkinson's disease (PD) is considered to be the second most common neurodegenerative disorder affecting currently about 1% of the world population Some projections point to a large increase in this prevalence over the next decades.

Dual-task training should be considered as part of the rehabilitation process of these patients although until now no guidelines have been defined for this type of intervention.

This type of intervention should be able to improve dual-task performance and/or improve motor and cognitive components individually regarding specific dual-task training, recent studies have demonstrated its efficacy in various populations such as the elderly and individuals with neurological diseases, with the most notable improvements in gait and balance.

1.4.OBJECTIVES OF THE STUDY:

To find out the "Effectiveness of dual task training versus conventional therapy on improving balance and executive functions in parkinson's patients"

1.5.VARIABLES OF THE STUDY:

INDEPENDENT VARIABLES:

- DUAL TASK TRAINING
- CONVENTIONAL THERAPY

DEPENDENT VARIABLES:

- BERG BALANCE SCALE
- MINI MENTAL STATE EXAMINATION

1.6.OPERATIONAL DEFINITION :

- **Definition** of **Parkinson's disease**:
  A chronic progressive neurological disease chiefly of later life that is linked to decreased dopamine production in the substantia nigra and is marked especially by tremor of resting muscles, rigidity, slowness of movement, impaired balance, and a shuffling gait.

  - Dr.James Parkinson

- **Berg balance scale**
  The berg balance scale is a widely used clinical test of a person's static and dynamic balance abilities. The test takes 15-20 minutes and comprises a set of 14 simple balance related tasks, ranging from stand up from a sitting position, to standing on one foot

  -Katherine Berg

- **Mini mental state examination**
  The mini mental state examination or folstein test is a 30-point questionnaire that is used extensively in clinical and research settings to measure cognitive impairment

  –Folstein et al

1.7.HYPOTHESIS

1.7. A. NULL HYPOTHESIS

There will be no significant improvement in the effectiveness of dual task training versus conventional therapy on improving balance and executive functions in parkinson's patients.

1.7.B. ALTERNATE HYPOTHESIS

There will be significant improvement in the effectiveness of dual task training versus conventional therapy on improving balance and executive functions in parkinson's patients.

1.8. ASSUMPTION

The study had been conducted assuming that dual task training will improve balance and executive functions in Parkinson's patients.

CHAPTER 2

REVIEW OF LITERATURE

CHAPTER 2

REVIEW OF LITERATURE

DS NICHOLS-LARSEN.ET.AL (2016)

The purpose of the study is to determine the effectiveness of motor-cognitive dual-task training (DTT) compared to usual care on mobility and cognition in individuals with neurologic disorders.

YOGEV-SELIGMANN G.ET.AL (2012)

This is to evaluate Impairments in the ability to perform another task while walking (ie, dual tasking [DT]) are associated with an increased risk of falling.

MARJORIE H WOOLLACOTT.ET.AL (2011)

The purpose of the study is to evaluate either a single or dual task gait training group. Both groups will receive 12 hours of walking training over 4 weeks. The single task group will undertake gait training with cueing strategies to increase step length. The dual task group will train to improve step length when walking and performing a variety of added tasks.

HEIDI GUERRA SALETA ET AL (2011)

The aim of this study was to analyze the efficacy of a cognitive training program on cognitive performance and quality of life in nondemented Parkinson's disease patients

JACOB G ET AL (2011)

This investigation assessed the relation between demographic, clinical, mobility and balance metrics and falls history in persons with parkinsons disease.

NICOLA SMANIA, ET AL,(2010)

The purpose of the study is to evaluate the effects of balance training on PI in patients with PD.. A program of balance training can improve PI in patients with PD.

MICHAEL SCHWENL.EL AL(2010)

The purpose of the study is to determine the effect of dual task training in improving motor and cognitive performance in patients with parkinsons disease.

SANDRA G.BRAUER.ET AL(2010)

The purpose of the study is to determine Improvements in gait speed occurred in three of the six added tasks. When other gait variables were examined, such as step length variability, few improvements with training were found.

JOHN E.DUDA ET AL(2009)

Mild cognitive impairment was found in 29.2% of PD patients, with 17.9% demonstrating single domain and 11.3% multiple domain impairment. Memory and attention impairment were most common (15.1% and 17.0%, respectively), followed by executive impairment (8.5%). Depending on the measure of disease severity chosen, increasing age and disease severity, anti-anxiety medication use, and a suggestion for increasing severity of daytime sleepiness were independent predictors of cognitive impairment.

RUTH FERREIRASANTOS ET AL(2009)

The purpose of the study is to determine the benefits of physical exercise on cognitive functioninghave been reported in the literature, but the potential benefits to slow the eventual decline in executive functioning (EF) caused by neurodegeneration from Parkinson's patients.

DANIELAEDLERMD.ET.AL(2008)

The purpose of the study to determine Equilibrium and gait improved in patients with PD receiving conventional WBV or conventional PT in the setting of a comprehensive rehabilitation program. There was no conclusive evidence for superior efficacy of WBV compared with conventional balance training.

CINDY ZADIKOFF MD ET AL(2008)

The mini-mental state examination (MMSE) often fails to detect early cognitive decline in patients with parkinsons disease. The Montreal cognitive assessment (MoCA) is a brief tool developed to detect mild cognitive impairment that assesses a broader range of domains frequently affected in PD.

SHMUEL SPRINGER MSPT.ET AL(2006)

The purpose of the study evaluate performing dual tasks, all three groups significantly decreased their gait speed.

GEBHARDSAMMER.ET AL(2006)

The purpose of the study is to find out the effect of short-term cognitive executive function training program that is tailored to the individual patient's with parkinsons disease.

QUTUBUDDIN A ET AL(2005)

BBS score showed significant correlations with indicators of motor functioning, stage of disease, and daily living capacity.

RONAN ZIMMERMANN ET AL (2004)

The purpose of the study is to find the effect of training in 5 cognitive domains was measured by neuropsychological testing at baseline and after training.

STANKOVIC.ET AL (2004)

The purpose of the study is to tests balance in patients with parkinson's disease resulted in significant difference of values for stance, one leg stance, step test and external perturbation when compared to the control, and between group with and with out falling tendenvy

BRAZ J ET AL(2004)

The purpose of the present study was to translate and adapt the Berg balance scale, an instrument for functional balance assessment, to Brazilian-Portuguese and to determine the reliability of scores obtained with the Brazilian adaptation.-

HIRSCH MA.ET AL(2003)

The purpose of the study is to determine Muscle strength and balance can be improved in persons with IPD by high-intensity resistance training and balance training.

CHAPTER 3

MATERIALS AND METHODOLOGY

CHAPTER 3

MATERIALS AND METHODOLOGY

3.1. MATERIALS

- Treatment couch
- Treatment chair
- Towel
- Stop clock
- Arm rest Chair
- Foam mattress
- Ball
- Wobble board
- Resistance band
- Puzzle board, Letters and Pictures

3.2 . METHODOLOGY

- All patients underwent a neurological examination, balance and cognitive Evaluation.
- Berg balance scale is conducted to know the balance evaluation.
- Mini mental state examination scale is conducted to know cognitive impairment

3.2.1. STUDY DESIGN

- Quasi Experimental design Pre and Post experimental Study design.

3.2.2. STUDY SETTING

- Senthil Neuro Speciality Hospital, Erode.
- Bharath Neuro Center, Erode.
- RKR Neuro Hospital, Erode.
- Out Patient Department -Nandha College of Physiotherapy, Erode.

3.2.3.SAMPLE SIZES

Sample size is 30 subjects

- Group A-15 patients.
- Group B-15 patients.

3.2.4. SAMPLING METHOD

- Convenient Sampling Method.

3.2.5.STUDY POPULATION

- Patients with age group of 39-75 years having Parkinson disease.

3.2.6. DURATION OF THE STUDY

- 9 months.

3.2.7.TREATMENT DURATION

- Study was carried out for 6 weeks for each individual.
- Dual task training was performed 60 minutes session four days per week.
- Conventional therapy was performed 60 minutes session four days per week.

3.3.CRITERIA FOR SAMPLE SELECTION

3.3 (A) INCLUSION CRITERIA

- Both genders.
- Age group between 39-75 years.
- Sufficient hearing and vision.
- Patients with parkinson's disease.
- Capacity to walk ten meters without gait assistance.

3.3 (B) EXCLUSION CRITERIA

- Sub thalamic neurosurgery
- Neuro musculoskeletal surgery.
- Psychiatric disorders.
- Illiteracy.
- Cognitive symptoms making it difficult to understand the study information, or follow the instructions.
- Having medical care related to impaired walking during the past 3 months.
- Having participated in the balance exercise administered by the health care personal for the past 30 days
- Subject aged below 39 and above 75 years of age.
- History of any recent trauma or fracture.
- Osteoporosis.

3.4. PARAMETER

- Berg balance scale
- Mini mental state examination

3.5. PROCEDURE

- Subjects were selected by convenient sampling method. 30 subjects who fulfilled inclusion and exclusion criteria were selected by random sampling method, out of them 15 were allotted in Group A and 15 in Group B.
- Subjects were clearly explained about the study and written informed consent was obtained from the subjects who fulfilled the criteria.
- After completing the informed content and they were explained about the scale and the scale was administered.
- Proper instructions such as purpose, safety measures, comfort, precautions and psychological support were given.
- All vital signs were checked.
- While doing the assessment, the subject's willingness to continue the procedure with or without rest was given preference.
- Both Group A and Group B subjects were involved for pre test assessment.
- Dual task training was performed 60 minutes session four days per week.
- Conventional therapy was performed 60 minutes session four days per week.

GROUP-A [DUAL TASK TRAINING]

PROCEDURE:

All participants received balance training that was administered individually four times in a week (60 min/session) for six weeks. All participants performed the same motor tasks; however, the participants of the dual-task group underwent the cognitive-motor dual-task training program and performed the cognitive tasks simultaneously with the motor tasks, while the participants of the dual-task group only underwent the single task motor training program and thus only performed the motor tasks.

The intervention program was based on an existing training program.Each session was organized into 4 stations of intervention, according to Gentile's taxonomy (Gentile, 2000)

- **Stability without manipulation activities** (e.g. to stand on top of a foam mattress with the eyes closed)

Fig:3.1. standing on the foam mattress.

- **Gait without manipulation** (e.g.: walk on a narrow path)
- **Stability with handling activities** (e.g. rotate the waist holding a ball)
- **Gait manipulation activities** (e.g. walking backwards around objects while holding a ball).

In the dual-task training, the cognitive activities included

- **digit span** (memorize a set of letters or numbers and repeat them in forward or reverse order)

Fig:3.2.Executive function training

- **N-back** naming a preceding word, letter or number to the one given by the therapist.
- **Spelling words** - therapist says words to be spelled in the correct order.
- **Stroop test** - consists of two tasks, reading and naming colours. In both, the stimuli are colour names printed in an incongruent colour.
- **Image description** - a picture is placed in front of the participant who should describe it with maximum detail.
- **Nomination** - the participant must say names in a given category: flowers, animals, countries or beginning with a letter of the alphabet.
- **Counting** - counting in forward and reverse order.
- **Description of daily activities and routines** - describe the activities that they normally do during a weekday or weekend and describe how to do these activities, e.g. what are the stages of taking a shower.

All participants in the dual-task group performed the same cognitive activities, but not necessarily in the same order. The complexity of the exercises was increased as the sessions progressed. This increase was based on the addition of obstacles, reduction of the pause time, increasing the complexity of the cognitive task. Each participant received individual training by a professional for 12-15 minutes, which led to a total of 60 minutes per session. Between stations, the participants performed a transition exercise, which was getting up from and sitting down on a chair 15 times. Before beginning the exercises, all procedures were explained to the participant.

GROUP –B[CONVENTIONAL THERAPY]

PROCEDURE:

The participants received conventional therapy that was administered individually four times a week (60 min/session) for six weeks. Conventional therapy group only performed the motor task.

- **Bilateral upper& lower limb strengthening exercises** -manual resistance exercise, resistance band exercises.

Fig:3.3.Resistance band strengthening exercise

- **Mat activities** -prone on elbow, quadripod positioning, kneeling, half kneeling ,standing, one leg forward standing.

Fig:3.4.Mat activities.

- **Balance &coordination exercises** - frenkel exercise, finger to finger touch, finger to nose touch, wobble board.

Fig:3.5.Wobble board balance training.

- **Gait training.**

The subjects were concentrated only on physical exercises.

CHAPTER 4

DATA PRESENTATION AND ANALYSIS

CHAPTER-4

DATA PRESENTATION AND STASTISTICAL ANALYSIS

STATISTICAL TOOLS

The statistical tools used in the study are paired t-test and unpaired t-test.

PAIRED 't' - TEST

The paired t-test was used to find out the statistical significance between pre and post t-test values of BBS and MMSE before and after treatment for Group A and Group B.

Formula for paired t-test,

$$S = \frac{\Sigma d^2 - \frac{(\Sigma d)^2}{n}}{n-1}$$

$$t = \frac{\bar{d}\sqrt{n}}{s}$$

d = difference between the pre test V_s post test

$\bar{d}$ = Mean difference

n = Total number of subjects

S = Standard deviation

UNPAIRED 't'- TEST

The unpaired t-test was used to compare the statistically significance difference of BBS and MMSE before and after treatment for Group A and Group B.

Formula for unpaired t –test,

$$S = \sqrt{\frac{(n_1-1){s_1}^2+(n_2-1){s_2}^2}{n_1+n_2-2}}$$

$$t = \frac{|\bar{x}_1-\bar{x}_2|}{s\sqrt{\frac{1}{n_1}+\frac{1}{n2}}}$$

n_1 = Total number of subject in group A.

n_2 = Total number of subject in group B.

x_1 = Difference between pre test and post test of Group A.

$\overline{x_1}$ = Mean difference between pre test and post test of group A.

X_2 = Difference between pre test and post test of Group B.

$\overline{X}_2$ = Mean difference between pre testand post test of Group B.

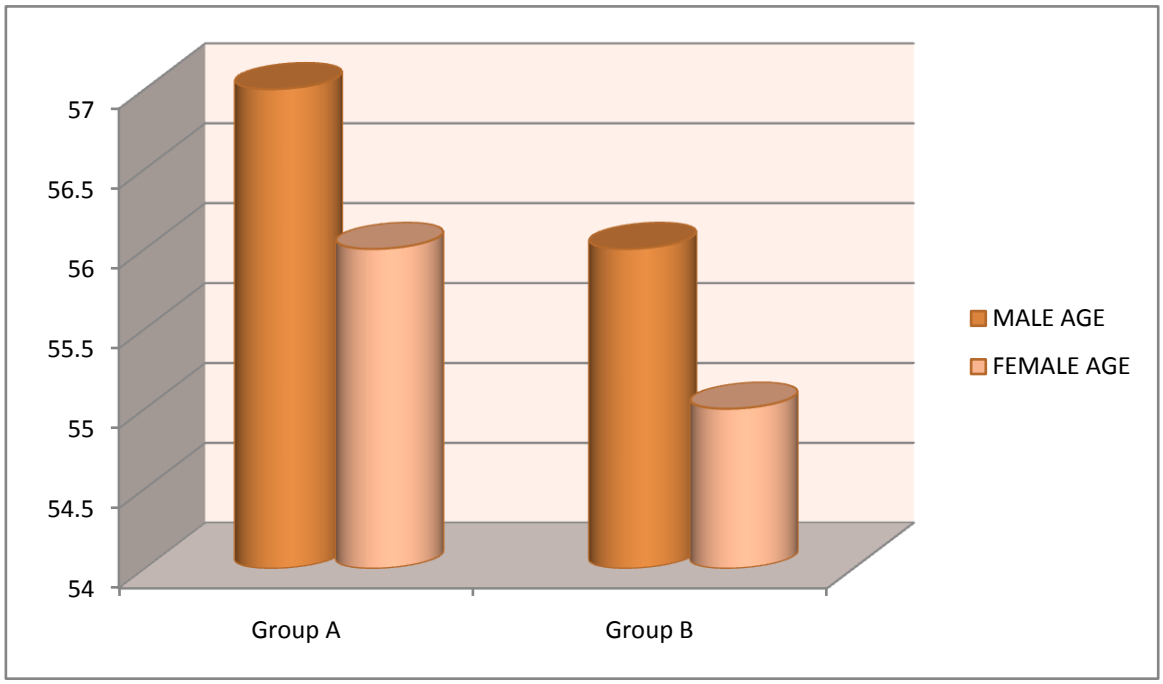
S = Standard Deviation.

TABLE-4.1

MEAN AVERAGE AGE GROUP OF GROUP A AND GROUP B

Mean Age Group	Group A	Group B
Female's	56	55
Male's	57	56

FIG-4.1 THE MEAN AVERAGE AGE OF GROUP A AND GROUP B



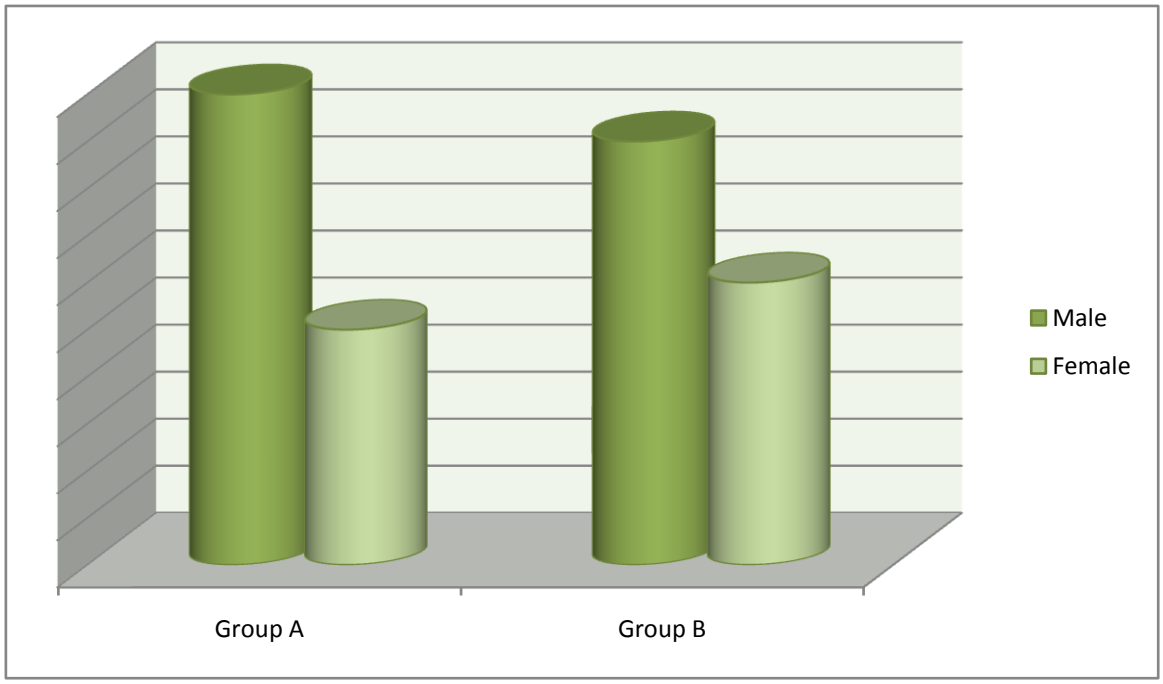
SEX DISTRIBUTION OF GROUP A AND GROUP B

Table 4.2 and Figure 4.2 shows the sex distribution among the study. There are 60% of males and 40% of females in both Groups.

TABLE-4.2

Sex Distribution	Group A	Group B
Female's	5	6
Male's	10	9

FIG 4.2 SEX DISTRIBUTION OF GROUP A AND GROUP B



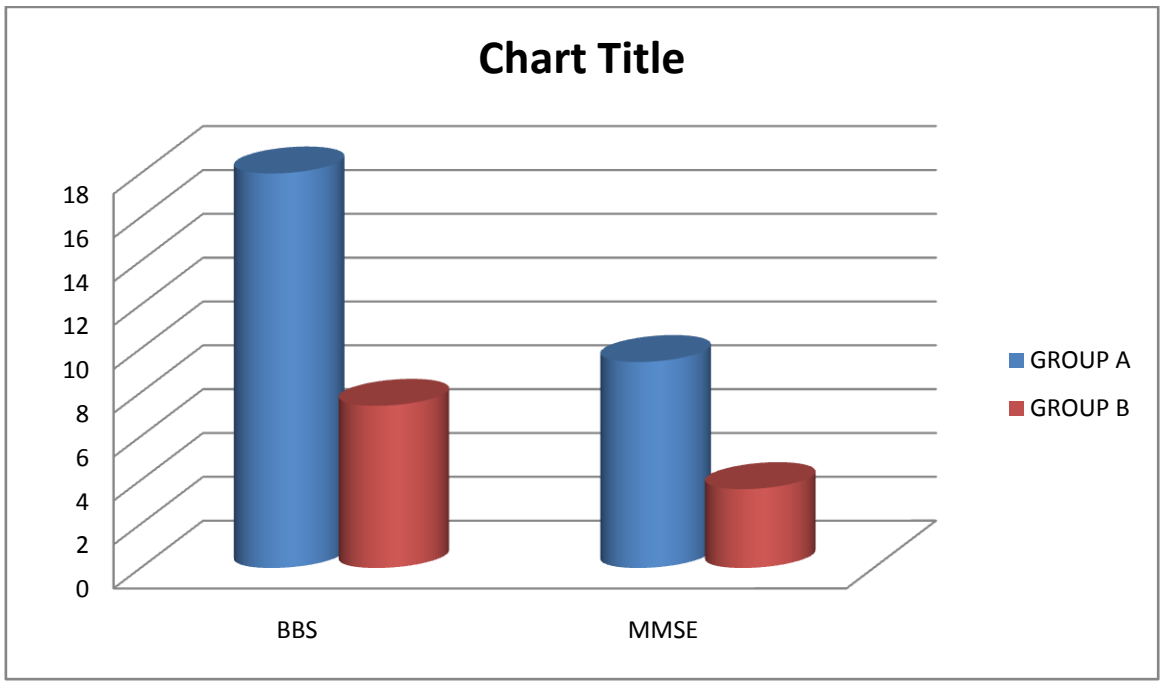
MEAN DIFFERENCE OF GROUP A AND GROUP B OF BBS AND MMSE

TABLE-4.3

GROUPS	MEAN DIFFERENCE	
	BBS	MMSE
GROUP-A	18.2	9.4
GROUP-B	7.4	3.6

Mean difference of BBS for Group A and B is 18.2 & 7.4 respectively.
Mean difference of MMSE for Group A and B is 9.4 &3.6 respectively.

FIGURE-4.3 (MEAN DIFFERENCE OF BBS AND MMSE SCALES)



STANDARD DEVIATION OF GROUP A AND GROUP B OF

BBS AND MMSE

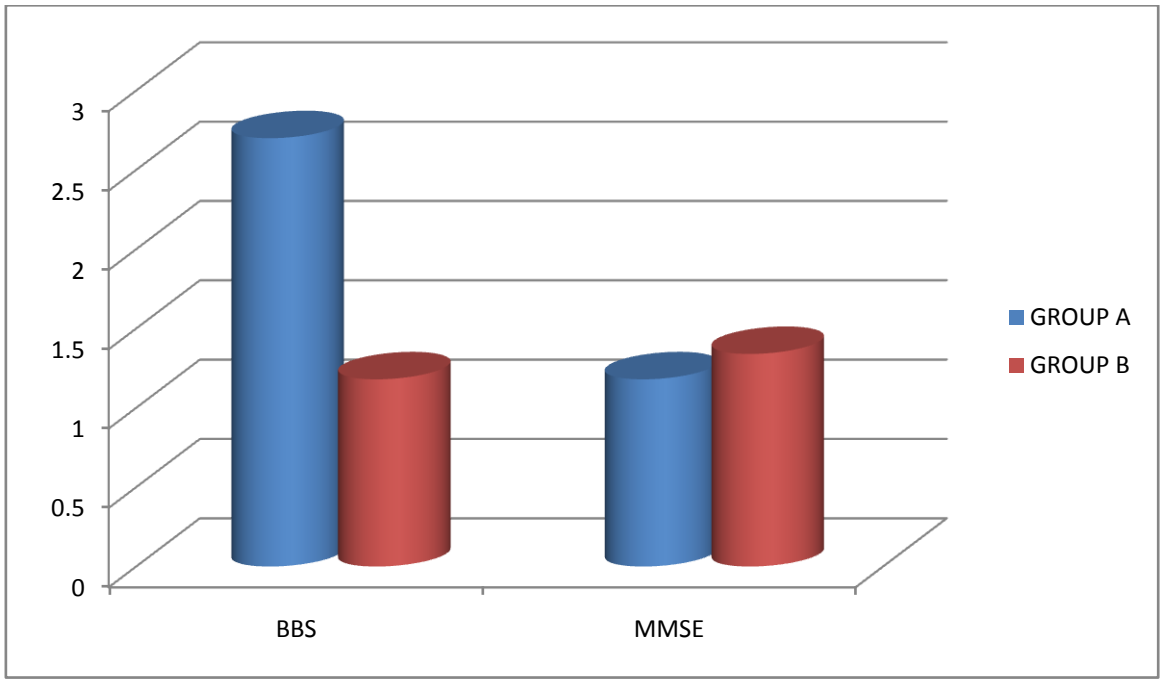
TABLE-4.4

GROUPS	STANDARD DEVIATION	
	BBS	MMSE
GROUP A	2.7	2.12
GROUP B	1.18	1.34

Group A standard deviation value is 2.7 and 2.12 respectively.

Group B standard deviation value is 1.18 and 1.34 respectively.

FIGURE-4.4. (STANDARD DEVIATION OF BBS AND MMSE SCALE)



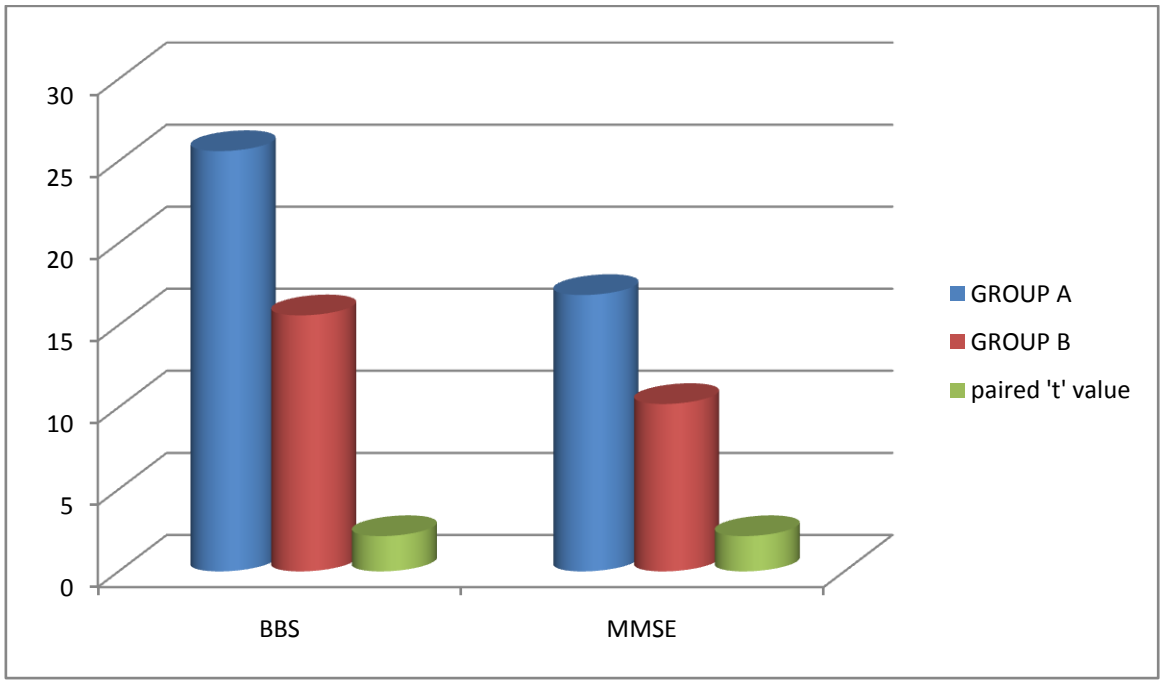
COMPARISION OF THE PAIRED 't' TEST AND TABLE VALUE BETWEEN GROUP A AND GROUP B

TABLE-4.5

GROUPS	CALCULATED ' t'VALUE		TABLE VALUE	SIGNIFICANCE
	BBS	MMSE		
GROUP A	25.61	16.84	2.15	SIGNIFICANT
GROUP B	15.6	10.20	2.15	SIGNIFICANT

For 9 degree of freedom and at 5%level of significance, the table value is 2.15 and the calculated group A t value is 25.61 and 16.84, the group B t value is 15.6 and 10.20 since the calculated 't' values was greater than the table t value, null hypothesis is rejected.

FIGURE-4.5. (PAIRED 't' TEST AND TABLE VALUE OF BBS AND MMSE SCALE)



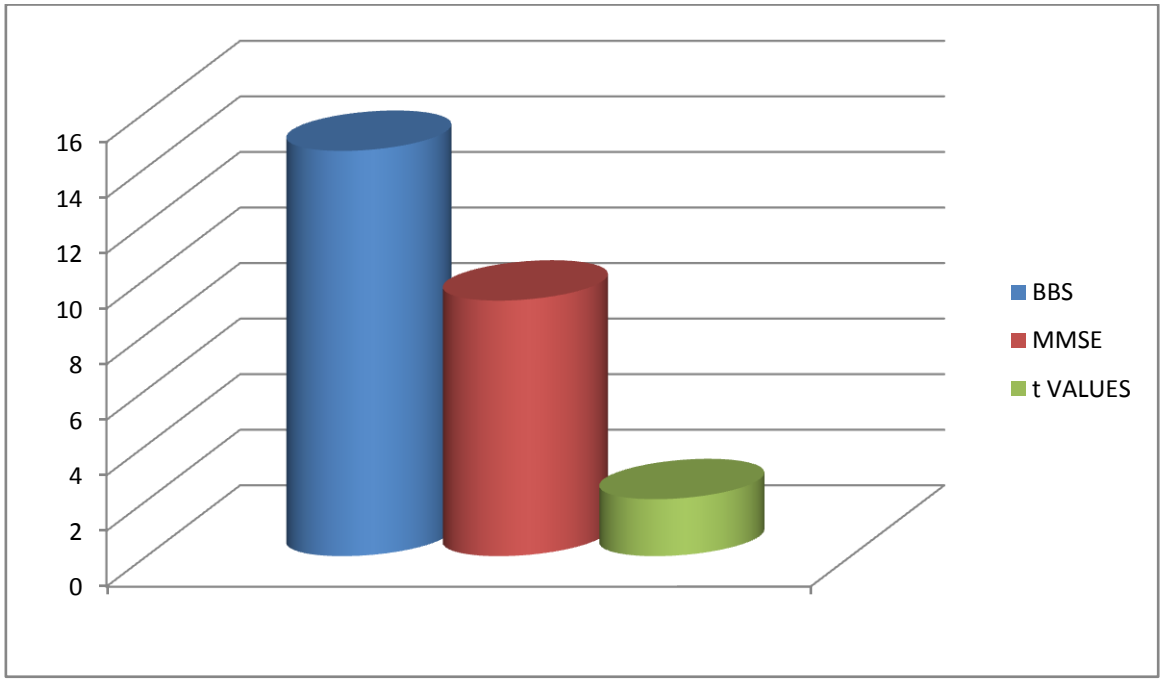
COMPARISION OF UNPAIRED 't' TEST AND TABLE VALUE BETWEEN BBS AND MMSE

TABLE-4.6

GROUP	UNPAIRED 't' TEST		TABLE VALUE	SIGNIFICANT
GROUP A & GROUP B	BBS	MMSE	2.05	SIGNIFICANT
	14.59	9.2		

For 9 degree of freedom and at 5% level of significance, the table values is 2.05 and the calculated BBS unpaired 't' value is 14.59 and the MMSE unpaired 't' value is 9.2 since the calculated unpaired 't' value was greater than the table t value, null hypothesis is rejected.

FIGURE -4.6.(UNPAIRED 't' TEST AND TABLE VALUE OF MMSE)



CHAPTER 5

RESULTS AND DISCUSSION

CHAPTER-5

RESULT AND DISSCUSSION

The study sample comprised 30 patients of which 19 were male and 11 were female patients with parkinson's disease. Among 30 patients 15 were treated with dual task training and other 15 patients were treated with conventional therapy . The pre and post test values were assessed by berg balance scale and mini mental state examination scale in group A . The mean difference value of BBS is 18.2, MMSE is 9.4 respectively. The standard deviation of BBS is 2.7, MMSE is 2.12 the paired t-test value for BBS is 25.61, MMSE is 16.84 respectively. The paired t-test value is more than the table value 2.15 or 5% level of significance at 14 degrees of freedom.

The pre and post test value were assessed by BBS and MMSE in group B. the mean difference value of BBS 7.4, MMSE is 3.6 respectively. The standard deviation of BBS 1.18,MMSE is 1.34 respectively. The Paired 't' test for BBS is 15.6 , MMSE is 10.20 respectively. The paired ' t' test value is more than the table value 2.15 or 5% level of significance at 14 degree of freedom.

The calculated ' t' value by unpaired t test for group A and B were 14.59 for BBS, MMSE is 9.2 . The calculated t value were more than the table value 2.05 for 5% level of significance at 28 degrees of freedom.

Discussions

Studies have reported the positive influence of dual task training in improving balance and executive functions in patients with parkinsons disease, whether for different cognitive components , including level of attention, processing speed, flexibility and alternating sequential. The study has demonstrated that in a cognitive –motor-dual task training program with 24 sessions , the dual task training was only statistically more effective than conventional therapy.

In summary many studies have reported the effect of dual task training in improving motor and cognitive functions in other patients. this study emphasis on dual task training and improves balance and executive functions in Parkinson's patients. hence we recommend this exercise program to parkinson's patients.

This study has proved the immense effect of dual task training vs conventional therapy in improving balance and executive functions in patients with parkinsons disease.

CHAPTER 6

LIMITATION AND RECOMMENDATION

CHAPER-6

LIMITATION AND RECOMMENDATION

Limitations

- The study has been concluded on small sized sample only.
- This study took shorter duration to complete.
- The study limitation includes only PD patients.

Recommendations

- A similar study may be extended with larger sample.
- Dual task training can also be applied over conditions like MS, TBI,SCI etc.,

CHAPTER 7

SUMMARY AND CONCLUSION

CHAPTER 7

SUMMARY

Parkinson's disease (PD) is considered to be the second most common neurodegenerative disorder affecting currently about 1% of the world population Some projections point to a large increase in this prevalence over the next decades PD is clinically defined by motor symptoms such as tremor at rest, rigidity, bradykinesia, as well as postural and gait modifications and also by nonmotor symptoms such as sleep disorders, cognitive impairment, depression and fatigue, some of which are adverse effects of the dopaminergic medication Another characteristic feature of PD is the difficulty to perform two tasks simultaneously. This difficulty is because the individuals have to focus on achieving normal movement patterns by activating the premotor cortex region without using the deficient basal ganglia circuit which is deficient in dopamine. Therefore, in dual-task situations that use the cortical resources to perform motor tasks, the performance of both the motor and cognitive components can be compromised From this point of view, dual-task training should be considered as part of the rehabilitation process of these patients.

To conduct the study ,the total number of 30 parkinson's disease patients at 39-75 the age group years .They were divided into two groups, Group A and Group B. Among the Group-A , received Dual task training. The subjects of Group-B received conventional therapy.

The pre and post test values were obtained using BERG BALANCE SCALE and MINI MENTAL STATE EXAMINATION . The pre and post values statistically analyzed and the results showed that DUAL TASK TRAINING were more beneficial than the CONVENTIONAL THERAPY.

CONCLUSION

This study concluded that 9 weeks intervention involving dual task training could result in a long lasting improvement of balance and executive functions in patients with parkinson's disease. From the result of this study conventional therapy shows improvement balance and executive functions , dual task training has more advantages over conventional therapy.

Based on 't' values ,it could be seen there is significant difference between the calculated values and table values. The mean and standard deviation between these groups shows greater from dual task training than conventional therapy.

Though the results , **ALTERNATE HYPOTHESIS IS ACCEPTED** and also the study could be concluded that **THERE IS SIGNIFICANT DIFFERENCE BETWEEN DUAL TASK TRAINING AND CONVENTIONAL THERAPY IN PARKINSON'S PATIENTS.**

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CHAPTER VII

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APPENDICES

APPENDICES

APPENDIX-1

NEUROLOGICAL ASSESSMENT FORM

Name :

Age :

Sex :

Occupation :

Residential Address :

Chief complaints :

Past medical history :

Present medical history :

Personal history :

Family history :

Associated problems :

Drug history :

Vital signs:

Temperature :

Blood pressure :

Heart rate :

Respiratory rate :

OBJECTIVE EXAMINATION

ON OBSERVATION

Body Built :

Posture :

Attitude of limbs :

Muscle wasting :

Pattern of movement :

Gait :

Pressure sore :

External Appliances :

Deformities :

PALPATION

Muscle tone :

Oedema :

Tenderness :

Warmth :

ON EXAMINATION

HIGHER MENTAL FUNCTIONS

LEVEL OF CONSCIOUSNESS :

ORIENTATION

Person:

Place :

Time :

MEMORY

Immediate :

Recent :

Remote :

ATTENTION :

COMMUNICATION :

EMOTIONAL STATUS :

2. HIGHER CORTICAL FUNCTION

COGNITION :

Fund of knowledge :

Calculation :

Proverb interpretation :

PERCEPTION

Body scheme/body image disorder :

Agnosia :

Apraxia :

3. CRANIAL NERVES :

4. SENSORY SYSTEM :

Superficial sensation :

Deep sensation :

Cortical sensation :

5. MOTOR SYSTEM

Muscle girth

Muscle girth	Arm	Forearm	Thigh	Calf
Right				
Left				

Muscle tone

UPPER LIMB	LOWER LIMB

Range of motion

Upper limb

Side	Shoulder						Elbow		Wrist	
	FLX	EXT	ABD	ADD	INT ROT	EXT ROT	FLX	EXT	FLX	EXT
RT										
LT										

Lower limb

Side	Hip						Knee		Ankle	
	FLX	EXT	ABD	ADD	INT ROT	EXT ROT	FLX	EXT	FLX	EXT
RT										
LT										

REFLEXES

SUPERFICIAL

Abdominal :

Plantar :

Corneal :

DEEP

Biceps :

Triceps :

Brachioradialis :

Ankle jerk :

Knee jerk :

6. INVOLANTARY MOVEMENTS:

7. BALANCE

Balance	Static	Dynamic
Sitting		
Standing		

8 .GAIT

Step length :

Stride length :

Width of base :

Cadence :

9. ASSISTIVE DEVICES :

10. PHYSICAL THERAPY DIAGNOSIS:

Direct impairments :

Indirect impairments :

Composite impairments :

Functional limitations :

11. INVESTIGATION :

12. CLINICAL DIAGNOSIS :

13. PHYSICAL THERAPY MANAGEMENT :

14. HOME PROGRAMM :

APPENDIX-2

ETHICAL CLEARANCE

Ethically permission for the study will be obtained from the subjects and a written consent will be taken from each subject who participates in this study, As this study involve human subjects the Ethical Clearance has been obtained from the Ethical committee of Nandha college of Physiotherapy, Erode as per the ethical guidelines for Bio-medical research on human subjects, 2000 ICMR,(Indian Council of Medical Research) New Delhi.

APPENDIX-3

Written Informed Consent Form

NANDHA COLLEGE OF PHYSIOTHERAPY, ERODE.

Informed consent form for the volunteers at "Nandha college of Physiotherapy, Erode", who will be participating in the research project entitled : "**Effectiveness of dual task training versus conventional therapy on improving balance and executive functions in parkinson's disease"**

Name of Principal Investigator	**271720062** Post graduate student
Name of Organization	Department of Physiotherapy, Nandha college of Physiotherapy, Erode.

This Informed Consent Form has two parts:

- Information Sheet (to share information about the research with you)
- Certificate of Consent (for signatures if you agree to take part)

You will be given a copy of the full Informed Consent Form

PART I: Information Sheet

Introduction

I, _____ post graduate student in the Department of Physiotherapy, Nandha college of Physiotherapy,Erode, am working on my dissertation titled "**Effectiveness of dual task training versus conventional therapy on improving balance and executive functions in parkinson's patients"**

I am going to give you information and invite you to be part of this research. You do not have to decide today whether or not you will participate in the research. Before you decide, you can talk to anyone you feel comfortable with about the research.

There may be some words that you do not understand. Please ask me to stop as we go through the information and I will take time to explain. If you have questions later, you can ask them and get yourself clarified.

Purpose of the research

Parkinson disease is progressive nerves system disorder that affects movement. symptoms start gradually, starting with a noticeable tremor in just one hand disorders also commonly causes stiffness or slowing of movement hence leading to imbalance and affect functional ,executive and cognitive functions.

Type of Research Intervention

In this study if you are selected, detailed history taking, clinical examination and routine investigations will be done.

Participant selection

Study group: Adult between age groups of 39-75 years presenting with history of parkinson's disease that occur following movement impairment and cognitive functions.

Voluntary Participation

Your participation in this research is entirely voluntary. It is your choice whether to participate or not. It will not affect our patient's treatment process.

Benefits

Personally you might be or may not be benefited in any way directly from the research. But by taking part in this research, you will be helping the scientific community.

Possible risks

There are no major physical risks for the person associated with these methods. Complications include exacerbation of symptoms after therapy which is rare possibility.

Reimbursements

You won't be given any monetary incentives or gifts for being a part of this research.

Confidentiality

The information that we collect from this research project will be kept confidential. Information about the patient that will be collected during the research will be put away and no-one but the researchers will be able to see it.

Right to Refuse or Withdraw

You do not have to take part in this research if you do not wish to do so. You may also stop participating in the research at any time you choose. It is your choice and all of your rights will still be respected.

Who to Contact

This proposal has been reviewed and approved by the Research and Ethical committee of Nandha college of physiotherapy, Erode, which is a committee whose task it is to make sure that research participants are protected from harm.

You can ask me any more questions about any part of the research study, if you wish to. Do you have any questions?

PART II: Certificate of Consent

I have read the foregoing information, or it has been read to me. I have been explained the procedure and complications. I am willing to participate in the study. I have had the opportunity to ask questions about it and any questions that I have asked have been answered to my satisfaction. I consent voluntarily to participate as a participant in this research.

Name of Participant_____

Signature of Participant _____

Date _____ Day/month/year

If illiterate a literate witness must sign (if possible, this person should be selected by the participant and should have no connection to the research team). Participants who are illiterate should include their thumb-print as well.

I have witnessed the accurate reading of the consent form to the potential participant, and the individual has had the opportunity to ask questions. I confirm that the individual has given consent freely.

Name of witness_____ Thumb print of participant

Signature of witness _____

Date _____

APPENDIX-4

MINI MENTAL STATE EXAMINATION

Patient's Name:_____ Date:_____

Instructions :Score one point for each correct response with in each questionor activity.

Maximum Score	Patient's Score	Questions
5		"What is the year? Season? Date? Day? Month?"
5		"Where are we now? State? County? Town/city? Hospital? Floor?"
3		The examiner names three unrelated objects clearly and slowly, then the instructor asks the patient to name all three of them. The patient's response issued for scoring. The examiner repeats the multilpatient learns all of them, if possible.
5		"Iwouldlikeyoutocountbackwardfrom100bysevens."(93,86,79, 72, 65,…) Alternative:"Spell WORLD backwards."(D-L-R-O-W)
3		"Earlier I told you the names of three things. Can you tell me what those were?"
2		Show the patient two simple objects, such as a wrist watch and a pencil, and ask the patient to name them.
1		"Repeat the phrase:'No ifs, ands,or buts.'"
3		"Take the paper in your right hand, fold it in half, and put it on the floor." (The examiner gives the patient a piece of blank paper.)
1		"Please read this and do what it says."(Written instruction is"Close your eyes.")
1		"Make up and write a sentence about anything."(This sentence must contain a noun and a verb.)
1		"Please copy this picture."(The examiner gives the patient a blank piece of paper and asks him/her to draw the symbol below. All 10 angles must be present and two must intersect.)
30		TOTAL

BERG BALANCE SCALE

Description:

14-item scale designed to measure balance of the older adult in a clinical setting.

Berg Balance Scale

Name: _____ Date: _____

Location: _____ Rater: _____

ITEM DESCRIPTION	SCORE (0-4)
1. Sitting to standing	_____
2. Standing unsupported	_____
3. Sitting unsupported	
4. Standing to sitting	_____
5. Transfers	_____
6. Standing with eyes closed	_____
7. Standing with feet together	_____
8. Reaching forward with outstretched arm	_____
9. Retrieving object from floor	_____
10. Turning to look behind	_____
11. Turning 360 degrees	_____
12. Placing alternate foot on stool	_____
13. Standing with one foot in front	_____
14. Standing on one foot	_____

Total _____

GENERAL INSTRUCTIONS

Please document each task and/or give instructions as written. When scoring, please record the lowest response category that applies for each item.

In most items, the subject is asked to maintain a given position for a specific time. Progressively more points are deducted if:

- the time or distance requirements are not met
- the subject's performance warrants supervision
- the subject touches an external support or receives assistance from the examiner

Subject should understand that they must maintain their balance while attempting the tasks. The choices of which leg to stand on or how far to reach are left to the subject. Poor judgment will adversely influence the performance and the scoring.

Equipment required for testing is a stopwatch or watch with a second hand, and a ruler or other indicator of 2, 5, and 10 inches. Chairs used during testing should be a reasonable height. Either a step or a stool of average step height may be used for item # 12.

Berg Balance Scale

1. SITTING TO STANDING

INSTRUCTIONS: Please stand up. Try not to use your hand for support.

( ) 4 able to stand without using hands and stabilize independently

( ) 3 able to stand independently using hands

( ) 2 able to stand using hands after several tries

( ) 1 needs minimal aid to stand or stabilize

( ) 0 needs moderate or maximal assist to stand

2. STANDING UNSUPPORTED

INSTRUCTIONS: Please stand for two minutes without holding on.

( ) 4 able to stand safely for 2 minutes

( ) 3 able to stand 2 minutes with supervision

( ) 2 able to stand 30 seconds unsupported

( ) 1 needs several tries to stand 30 seconds unsupported

( ) 0 unable to stand 30 seconds unsupported

If a subject is able to stand 2 minutes unsupported, score full points for sitting unsupported. Proceed to item #4.

3. SITTING WITH BACK UNSUPPORTED BUT FEET SUPPORTED ON FLOOR OR ON A STOOL

INSTRUCTIONS: Please sit with arms folded for 2 minutes.

( ) 4 able to sit safely and securely for 2 minutes

( ) 3 able to sit 2 minutes under supervision

( ) 2 able to able to sit 30 seconds

( ) 1 able to sit 10 seconds

( ) 0 unable to sit without support 10 seconds

4. STANDING TO SITTING

INSTRUCTIONS: Please sit down.

( ) 4 sits safely with minimal use of hands

( ) 3 controls descent by using hands

( ) 2 uses back of legs against chair to control descent

( ) 1 sits independently but has uncontrolled descent

( ) 0 needs assist to sit

5. TRANSFERS

INSTRUCTIONS: Arrange chair(s) for pivot transfer. Ask subject to transfer one way toward a seat with armrests and one way toward a seat without armrests. You may use two chairs (one with and one without armrests) or a bed and a chair.

( ) 4 able to transfer safely with minor use of hands

( ) 3 able to transfer safely definite need of hands

( ) 2 able to transfer with verbal cuing and/or supervision

( ) 1 needs one person to assist

( ) 0 needs two people to assist or supervise to be safe

6. STANDING UNSUPPORTED WITH EYES CLOSED

INSTRUCTIONS: Please close your eyes and stand still for 10 seconds.

( ) 4 able to stand 10 seconds safely

( ) 3 able to stand 10 seconds with supervision

( ) 2 able to stand 3 seconds

( ) 1 unable to keep eyes closed 3 seconds but stays safely

( ) 0 needs help to keep from falling

7. STANDING UNSUPPORTED WITH FEET TOGETHER INSTRUCTIONS: Place your feet together and stand without holding on.

( ) 4 able to place feet together independently and stand 1 minute safely

( ) 3 able to place feet together independently and stand 1 minute with supervision

( ) 2 able to place feet together independently but unable to hold for 30 seconds

( ) 1 needs help to attain position but able to stand 15 seconds feet together

( ) 0 needs help to attain position and unable to hold for 15 seconds

Berg Balance Scale continued…..

8. REACHING FORWARD WITH OUTSTRETCHED ARM WHILE STANDING

INSTRUCTIONS: Lift arm to 90 degrees. Stretch out your fingers and reach forward as far as you can. (Examiner places a ruler at the end of fingertips when arm is at 90 degrees. Fingers should not touch the ruler while reaching forward. The recorded measure is the distance forward that the fingers reach while the subject is in the most forward lean position. When possible, ask subject to use both arms when reaching to avoid rotation of the trunk.)

( ) 4 can reach forward confidently 25 cm (10 inches)
( ) 3 can reach forward 12 cm (5 inches)
( ) 2 can reach forward 5 cm (2 inches)
( ) 1 reaches forward but needs supervision
( ) 0 loses balance while trying/requires external support

9. PICK UP OBJECT FROM THE FLOOR FROM A STANDING POSITION

INSTRUCTIONS: Pick up the shoe/slipper, which is place in front of your feet.

( ) 4 able to pick up slipper safely and easily
( ) 3 able to pick up slipper but needs supervision
( ) 2 unable to pick up but reaches 2-5 cm(1-2 inches) from slipper and keeps balance independently
( ) 1 unable to pick up and needs supervision while trying
( ) 0 unable to try/needs assist to keep from losing balance or falling

10. TURNING TO LOOK BEHIND OVER LEFT AND RIGHT SHOULDERS WHILE STANDING

INSTRUCTIONS: Turn to look directly behind you over toward the left shoulder. Repeat to the right. Examiner may pick an object to look at directly behind the subject to encourage a better twist turn.

( ) 4 looks behind from both sides and weight shifts well
( ) 3 looks behind one side only other side shows less weight shift
( ) 2 turns sideways only but maintains balance
( ) 1 needs supervision when turning
( ) 0 needs assist to keep from losing balance or falling

11. TURN 360 DEGREES

INSTRUCTIONS: Turn completely around in a full circle. Pause. Then turn a full circle in the other direction.

( ) 4 able to turn 360 degrees safely in 4 seconds or less

( ) 3 able to turn 360 degrees safely one side only 4 seconds or less

( ) 2 able to turn 360 degrees safely but slowly

( ) 1 needs close supervision or verbal cuing

( ) 0 needs assistance while turning

12. PLACE ALTERNATE FOOT ON STEP OR STOOL WHILE STANDING UNSUPPORTED

INSTRUCTIONS: Place each foot alternately on the step/stool. Continue until each foot has touch the step/stool four times.

( ) 4 able to stand independently and safely and complete 8 steps in 20 seconds

( ) 3 able to stand independently and complete 8 steps in > 20 seconds

( ) 2 able to complete 4 steps without aid with supervision

( ) 1 able to complete > 2 steps needs minimal assist

( ) 0 needs assistance to keep from falling/unable to try

13. STANDING UNSUPPORTED ONE FOOT IN FRONT

INSTRUCTIONS: (DEMONSTRATE TO SUBJECT) Place one foot directly in front of the other. If you feel that you cannot place your foot directly in front, try to step far enough ahead that the heel of your forward foot is ahead of the toes of the other foot. (To score 3 points, the length of the step should exceed the length of the other foot and the width of the stance should approximate the subject's normal stride width.)

( ) 4 able to place foot tandem independently and hold 30 seconds

( ) 3 able to place foot ahead independently and hold 30 seconds

( ) 2 able to take small step independently and hold 30 seconds

( ) 1 needs help to step but can hold 15 seconds

( ) 0 loses balance while stepping or standing

14. STANDING ON ONE LEG

INSTRUCTIONS: Stand on one leg as long as you can without holding on.

( ) 4 able to lift leg independently and hold > 10 seconds

( ) 3 able to lift leg independently and hold 5-10 seconds

( ) 2 able to lift leg independently and hold ≥ 3 seconds

( ) 1 tries to lift leg unable to hold 3 seconds but remains standing independently.

( ) 0 unable to try of needs assist to prevent fall

( ) TOTAL SCORE (Maximum = 56)

APPENDIX-5

MASTER CHART

BERG BALANCE SCALE

PRE AND POST TEST SCORES OF GROUP A AND GROUP B

SL. NO.	GROUP A(BBS)		GROUP B (BBS)	
	PRE TEST	POST TEST	PRE TEST	POST TEST
01	36	54	32	40
02	38	52	34	43
03	34	52	30	38
04	38	56	32	38
05	32	54	30	36
06	36	52	34	42
07	38	54	32	40
08	36	56	30	38
09	32	54	34	42
10	38	52	32	38
11	36	56	30	36
12	32	54	32	38
13	36	52	34	44
14	32	52	32	40
15	36	54	34	42

MINI MENTAL STATE EXAMINATION

PRE AND POST TEST SCORES OF GROUP A AND GROUP B

SL. NO.	GROUP A(MMSE)		GROUP B (MMSE)	
	PRE TEST	POST TEST	PRE TEST	POST TEST
01	16	24	14	20
02	18	26	12	16
03	14	22	16	14
04	16	28	12	16
05	14	24	14	16
06	16	26	12	16
07	16	24	14	18
08	14	22	12	16
09	14	26	14	16
10	18	26	12	18
11	16	24	14	16
12	18	26	14	18
13	14	28	16	20
14	16	24	12	16
15	14	26	12	14

APPENDIX- 6

ABSTRACT

AIM: The aim of this study was to analyze the efficacy of cognitive-motor dual-task training compared with conventional therapy on balance and executive functions in patients with Parkinson's disease.

TYPE OF STUDY: Quasi Experimental design Pre and Post experimental Study design.

MATERIALS AND METHODOLOGY: 30 subjects, aged between 39 and 75 years old were randomly assigned to the dual task training group (n=15) and conventional therapy (n=15) groups. The training was run four times a week for Six weeks. The dual task group received balance training and cognitive tasks simultaneously. The conventional group received motor task only.

RESULTS AND CONCLUSION: The results suggest superior outcomes after 6 weeks for the dual-task training compared to the conventional therapy training for balance and executive functions, significant improvement noticed in dual-task training group.

Keywords

Parkinson’s disease, dual-task training, executive functions, motor task.